FIBERQUANT ANALYTICAL SERVICES

Determination of Asbestos Structures in Air

JobNumber:	**201207887**

Client:

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 # Samples: 6 TEM **Rec:** 8/18/2012 **Method:** Modified AHERA TEM TEM analysis of air sample

Client Job: Admin Bldg **PO Number:** 18053

Report Date: 8/18/2012 **Date Analyzed:** 8/18/2012 **Routing Number:** -

Method and Analysis Information: **Fiberquant Internal SOP:** TEMm

Sample preparation and analysis are as described in AHERA (Appendix A to Subpart E - Interim Transmission Electron Microscopy Analytical Methods, US EPA 40 CFR Pt. 763, Mandatory Method). The "modified" title is used for sets of samples which do not meet the strict rules of AHERA (e.g., numbers of samples or minimum volumes), but are still desired to be analyzed using AHERA procedures. Each cassette is first wiped with a damp cloth to prevent contamination of the filter insides. Then, a wedge of filter is excised using a cleaned scalpel. The wedge is placed on a new glass slide, and cleared using hot acetone vapor from a "hot block" apparatus. The cleared filter is then ashed in a plasma etcher to remove 1-2 um of filter from its surface, then coated with 100-200 um of carbon in a carbon evaporator. The carbon encapsulates all of the larger and most of the smaller particulate on the filter. Three mm square pieces of the coated filter are placed on copper TEM grids, and the original filter material is dissolved away in a Jaffe wick and/or condensation washer. The finished replica in carbon containing the particulate is then examined on a transmission electron microscope at 10,000 to 20,000x magnification. All asbestos fiber structures >0.5um in length are characterized as asbestos or non-asbestos using a combination of morphology, electron diffraction characteristics, and elemental composition. A "structure" has certain narrow characteristics as defined in AHERA, and may be a single fiber, a bundle of parallel fibrils, a "matrix" structure (a fiber(s) extending out of a non-fibrous particle), or a cluster of matted or inter-connected fibers. Results are calculated both in structures/mm2 of filter surface and as structures/cc of air. The grid is scanned until an analytical sensitivity (the hypothetical observation of one structure) of at least 0.005 str/cc is reached up to a maximum of 20 grid openings. For samples having less volume than approximately 800 L, the analytical sensitivity can be expected to be higher than 0.005.

For clearance monitoring, AHERA (Asbestos Hazard Emergency Response Act) states that an area in a school may be re-occupied when the average of 5 inside air samples having a minimum volume of 1200 liters is <70 str/mm2 when measured by this method; or when 5 interior air samples have been shown to be statistically indistinguishable from 5 exterior air samples using the z-test. These criteria may be used on modified AHERA samples with the caution that averaging fewer samples than five may give statistically correct but numerically false results.

The coefficient of variation (CV) is estimated to be ~1.5 for the range 0 to 40 str/mm2, ~0.6 for the range 40 to 100 str/mm2, and ~0.4 for the range >100. 95% confidence ranges may be estimated as + or – twice the CV for any given result. Precision and accuracy for individual analysts is available upon request. Blanks, if analyzed, are treated the same as samples and are not used for correcting non-blank results.

The analysis was performed under an ongoing quality assurance program which includes: Client supplied blanks are prepared with each set of samples, and analyzed when sample asbestos levels are found to average >70 f/mm2, or at a level of one blank analysis per every 25 sample analyses. Lab blanks are also prepared with each set of samples, and analyzed in place of client blanks when none are submitted. Each analyst has suitable background credentials, such as at least a bachelor's degree in geology or chemistry, and has undergone extensive 2-6 month training in TEM techniques and mineralogy specific to TEM asbestos analysis before being allowed to perform client analyses. Unknown reference samples are routinely identified to ensure that each analyst can collect and correctly interpret TEM information. The TEM is aligned and its performance checked daily. Magnification, electron diffraction pattern size, and analytical performance characteristics are calibrated routinely. Samples are re-analyzed sometimes by the same analyst and sometimes by a different analyst in order to determine accuracy and precision. The total of QC analyses (blanks + recounts) are greater than 10% of analyzed samples. All quality checks performed for these samples were in control except as detailed in the "Analytical Notes" below. Each analyst participates in interlab round robins and proficiency testing in order to show correlation to other lab's analyses. Fiberquant is accredited by NVLAP (Lab #101031) to perform TEM analysis of asbestos in air samples. Accreditation does not imply endorsement by the EPA, any other United States governmental agency or any private agency or association. Each lab analysis refers only to the sample tested, and may not, due to the sampling process, be representative of the material sampled. This report may not be reproduced except in full, without the approval of Fiberquant Analytical Services.

Some results may have been calculated using client supplied data, such as volume or area sampled, for which Fiberquant assumes no liability for accuracy.

Job Analysis Notes:

Analysis Results:

Job Number:	201207887	Admin Bldg

Inside Samples

Lab Number	Client Number	Date	Vol (L)	Location	Condition	#GOs	GO Area	AmphiboleType(s)	str/mm2:	str/cc:
2012-07887- 1	TEM-1	8/18/2012	1200	Inside	acceptable	7	0.00969	-	*<15*	*<0.005*
Chrysotile All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0 to 0.02	
2012-07887- 2	TEM-2	8/18/2012	1200	Inside	acceptable	7	0.00969	-	*<15*	*<0.005*
Chrysotile All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0 to 0.02	
2012-07887- 3	TEM-3	8/18/2012	1200	Inside	acceptable	7	0.00969	-	*<15*	*<0.005*
Chrysotile All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0 to 0.02	
2012-07887- 4	TEM-4	8/18/2012	1200	Inside	acceptable	7	0.00969	-	*<15*	*<0.005*
Chrysotile All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0 to 0.02	
2012-07887- 5	TEM-5	8/18/2012	1200	Inside	acceptable	7	0.00969	-	*<15*	*<0.005*
Chrysotile All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0 to 0.02	
2012-07887- 6	TEM-6	8/18/2012	1200	Inside	acceptable	7	0.00969	chrysotile-	*15*	*0.005*
Chrysotile All:	1 str,	15 str/mm2,	0.005 str/cc.	Chrysotile >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.		
Amphibole All:	0 str,	<15 str/mm2,	<0.005 str/cc.	Amphibole >5um:		0 str,	<15 str/mm2,	<0.005 str/cc.	Non-Asbestos:	0 cnts
Analytical Sensitivity:	.005						95% Confidence Range:		0.002 to 0.03	

Average Str/mm2	*2.5*

Analyst: DAVID M. SCHALLER

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